

INTRACORONARY OPTICAL COHERENCE TOMOGRAPHY (OCT) AND HISTOLOGY 2, 3 AND 4 YEARS AFTER IMPLANTATION OF BIORESORBABLE EVEROLIMUS-ELUTING STENTS IN A PORCINE CORONARY MODEL: AN ATTEMPT TO DECIPHER THE HUMAN OCT IMAGES IN THE ABSORB TRIAL

i2 Poster Contributions

Georgia World Congress Center, Hall B5

Monday, March 16, 2009, 9:30 a.m.-10:30 a.m.

Session Title: Endovascular and New Technologies

Abstract Category: New Technologies/Innovations

Presentation Number: 2505-520

Authors: *Yoshinobu Onuma, Tskayuki Okamura, Nieves Gonzalo, Evelyn Regar, Willem van der Giessen, Laura Perkins, Jennifer Powers, Richard Rapoza, Renu Virmani, Thorax Center, Erasmus MC, Rotterdam, The Netherlands*

Background: Using optical coherence tomography (OCT), alterations of the struts of the everolimus-eluting, bioresorbable stent (BVS) implant have been reported in humans. In the absence of histology, the interpretation of the appearances of the struts by OCT remains speculative. We therefore report OCT findings with corresponding histology in the porcine coronary artery model at 2, 3 and 4 years after BVS implantation.

Methods: The BVS (3.0 x 12.0 mm) were implanted in 16 pigs that underwent OCT and were euthanized either at 2 years (n=3), at 3 years (n=5) or at 4 years (n=8) after implantation. For histological examination, sections were taken from the proximal, mid, and distal implanted arterial segment. Corresponding OCT and histology images were selected using the distal and proximal markers as landmarks. The appearance of struts by OCT were categorized into four subgroups and aligned with the histological counterpart.

Results: At 2 years, by OCT, 57.3 ± 16.6 struts were discernible per BVS with 80% strut sites showing sharply defined, bright reflection borders, best described as a box-shaped appearance. Despite their defined appearance by OCT, by histology, these structures were composed of proteoglycan without any polymeric material detectable by chromatography. At 3 years, by OCT, recognizable struts decreased to 27.6 ± 8.5 struts per BVS: 43.9% showed dissolved black box, 34.8% dissolved bright box, 16.3% open box, and 5% preserved box appearance. Histology shows that connective tissue cells within a proteoglycan-rich matrix replaced the areas previously occupied by the polymeric struts and coalesced into the arterial wall. At 4 years, by OCT, 10.1 ± 6.3 struts were recognizable as either dissolved black or dissolved bright box. In histology, these struts are minimally discernible by a focal lower density of connective tissue cells.

Conclusions: Still discernible struts by OCT at 2 years are compatible with completely bioresorbed struts by histological and chromatographic analysis. At three and four years, both OCT and histology confirm complete integration of the struts into the arterial wall.